REMARKS

Reexamination and reconsideration of the application are requested. Support for the amended claims is found in the specification, page 8, lines 4-5 and page 9, lines 16-19. It is noted that applicant's figure 7 shows a time-varying difference signal which is derived by subtracting the time-varying second signal of figure 5 from the time-varying first signal of figure 4 and that the time-varying difference signal of figure 7 takes into account both phase and amplitude differences between the time-varying signals of figures 4 and 5. For example, if the first signal was a sine wave signal and the second signal was the same sine wave signal but offset in phase from the first signal, the amplitudes of the first and second signals would be the same, but the difference signal would not be a zero signal because of the phase differences between the first and second signals, as can be appreciated by those skilled in the art.

The claims now require a time-varying difference signal (or sets thereof) which takes into account both phase and amplitude differences between first and second signals (or between signals of first and second sets of image frames or between signals of first and second image frames). The prior art cited by the Examiner, taken alone or in combination, including Okazaki and Lizzi, does not do this.

The Examiner, in the Advisor Action of February 7, 2006, states "time-varying embraces wavetrace subtraction".

Such a statement by the Examiner correctly describes, for example, applicant's claim 1 which requires subtracting a time-varying second signal reflected from a location during a later second time period following a discrete medical treatment (see applicant's figure 5) from a time-varying first signal reflected from the same location during a first time period (see applicant's figure 4) to derive a time-varying difference signal (see applicant's figure 7).

Such a statement by the Examiner does not correctly describe, for example, Okazaki '580 or Lizzi '726. Okazaki '580 teaches that a pixel gradation value for a location (see the particular level of gradation lightness or darkness for a particular pixel location in Okazaki's figure 4C) is derived by subtracting the fixed amplitude of a same-particular-location-reflected time-varying

-8-

second signal during treatment (see the particular level of gradation lightness or darkness for a same particular pixel location in Okazaki's figure 4B) from the fixed amplitude of a same-particular-location-reflected time-varying first signal (see the particular level of gradation lightness or darkness for a same particular pixel location in Okazaki's figure 4A) before treatment. Lizzi '726 teaches subtraction of image scans (see Lizzi's blocks 340 and 345) which, for a particular pixel location in an image scan, are subtractions of fixed amplitudes of signals identical to the teaching of Okazaki.

The amplitude difference of Okazaki or Lizzi is derived from the amplitudes of a particular before signal (i.e., a first signal) and a particular during treatment signal (i.e., a second signal) and is a fixed number and is not a time-varying difference signal. A different fixed number for Okazaki or Lizzi can be derived by subtracting the amplitudes of an additional new third signal and the previous second signal or by subtracting the amplitudes of additional new third and fourth signals. However, subtracting fixed amplitudes of third and second signals or fixed amplitudes of third and fourth signals to derive a different fixed number from the fixed number derived by subtracting fixed amplitudes of first and second signals is not subtracting a second signal from a first signal to derive a time-varying difference signal.

Applicant's claim 1 requires subtracting the second signal from the first signal to derive a time-varying difference signal. The prior art cited by the Examiner, taken alone or in combination, including Okazaki and Lizzi, does not do this.

Basically, the Examiner, in the Final Office Action, has rejected the claims citing prior art which subtracts the amplitudes of two time-varying signals received from a location. For example, if the amplitude of a first time-varying signal from a location was five, and the amplitude of a second time-varying signal from that location was two, subtracting the second signal from the first signal results in the number three and a pixel intensity related to the number three would be associated with that location in an ultrasound image of anatomical tissue which included that location. Basically, Applicant's claims subtract a second time-varying signal from a location (see Figure 5 of the application) from a first time varying signal from that location (see Figure 4 of the application) which results in a time-varying difference signal (see Figure 7 of the

application) and Applicant's claims then generate an indication from the difference signal, wherein the indication shows the effect of discrete medical treatment in the location in the anatomical tissue. It is clear that the time-varying difference signal (see Figure 7 of the application) is not the same as the number three or any other number which results from the subtraction of the amplitudes of two signals.

A question might be raised whether the difference in amplitudes of two time-varying signals is the same as the amplitude of the difference of two time-varying signals. The answer is no (see page 8, lines 4-7 of the specification). For example, consider a time-varying sine wave signal [$y1=\sin(x)$ where x is time] having an amplitude of one and a time-varying cosine wave signal [$y2=\cos(x)$] having an amplitude of one. The difference in the amplitudes of the two signals is zero. However, subtracting the cosine wave signal from the sine wave signal results in a signal [$y3=\sin(x)-\cos(x)$] which has an amplitude of about 1.4 which is not an amplitude of zero. It is noted that Attachment A of the Amendment After Final was a graph of $\sin(x)$, $\cos(x)$ and $\sin(x) - \cos(x)$.

The Examiner's rejection of claims 1-4, 9-10, 16-19, 23-24 and 30, as being "anticipated", under 35 U.S.C. 102, or in the alternative as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects these claims as being unpatentable over Okazaki '580 or as being unpatentable over Okazaki in view of Dory '258. Claims 2-4 and 9-10 depend from claim 1, and claims 17-19 and 23-24 depend from claim 16.

Claim 1 requires receiving time-varying first and second signals F_1 and F_2 (see figures 4-5) from the same location and subtracting the second signal from the first signal to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals (see figure 7).

Okazaki discloses in figure 4A a pixel gradation graph 22 of an image from a kidney before treatment, discloses in figure 4B a pixel gradation graph 22' of an image from the kidney during treatment, and discloses in figure 4C a pixel gradation graph 23 obtained from the subtraction of the pixel gradation graphs 22 and 22'. Note that each graph is a graph of pixel

gradation versus position (i.e., location), and that pixel gradation reflects the amplitude of the received signal. Note that figure 2 of Okazaki discloses an imaging scan area 27 which includes locations in line with, and to the sides of, the kidney 18. The amplitude of the signal before treatment at a first location (for example, a location one inch to the right of the pixel gradation axis) of a plurality of locations in figure 4B of Okazaki is subtracted from the amplitude of the signal during treatment at the same first location of the plurality of locations in figure 4A to yield the difference in the amplitudes at the same first location of the plurality of locations in figure 4C. The subtraction in Okazaki does not derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals as required by applicant's claim 1. Also, as noted in the specification, page 8, lines 4-7, computing the amplitude of the signal differences is different from computing the differences in signal amplitude. It is important to note that in ultrasound imaging, an amplitude of a time-varying signal is the maximum numerical value of the time-varying signal measured from its normal or equilibrium value taken as zero, as is understood by those skilled in the art.

Basically, applicant's claim 1 requires subtracting two time-varying signals received from the same location to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals whereas Okazaki discloses subtracting the amplitudes of two time-varying signals received from the same location to derive a difference in amplitudes which does not take into account both phase and amplitude differences between the first and second signals.

Claims 16 and 30 likewise require deriving a time-varying difference signal which takes into account both phase and amplitude differences between signals of first and second sets of image frames or between signals of first and second image frames, whereas Okazaki only discloses differences in amplitudes of two time-varying signals or in amplitudes of signals of two sets of image frames or in amplitudes of signals of two image frames which do not take into account both phase and amplitude differences of two signals or both phase and amplitude differences of signals of two sets of image frames or both phase and amplitude differences of signals of two image frames.

Dory '258, as in Okazaki, likewise subtracts the previous image from the current image (column 3, lines 51-58) which is subtracting the amplitude of a second signal from the amplitude of a first signal.

The Examiner's rejection of claims 1-4, 9-10, 16-19, 23-24 and 30, as being "anticipated", under 35 U.S.C. 102, or in the alternative as being "obvious", under 35 U.S. C. 103, is respectfully traversed. The Examiner rejects these claims as being unpatentable over Lizzi '726 or as being unpatentable over Lizzi '726 in view of Dory '258. Claims 2-4 and 9-10 depend from claim 1, and claims 17-19 and 23-24 depend from claim 16.

Claim 1 requires receiving time-varying first and second signals F_1 and F_2 (see figures 4-5) from the same location and subtracting the second signal from the first signal to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals (see figure 7).

Lizzi discloses in figure 3 acquiring first, second and third image scans and subtracting the second image scan from the third image scan (block 340) and subtracting the first image scan from the third image scan (block 345) to decide when to end therapy (block 350). A first image scan includes obtaining an amplitude of a first signal from a location in the image associated with a first time. A second image scan includes obtaining an amplitude of a second signal from the same location in the image associated with a second time. A third image scan includes obtaining an amplitude of a third signal from the same location in the image associated with a third time. Subtraction involving two such image scans includes a subtraction of amplitudes of two signals from the same location.

Basically, applicant's claim 1 requires subtracting two time-varying signals received from the same location to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals whereas Lizzi discloses subtracting the amplitudes of two time-varying signals received from the same location to derive a difference in amplitudes which does not take into account both phase and amplitude differences between the two signals.

Claims 16 and 30 likewise require deriving a time-varying difference signal which takes into account both phase and amplitude differences between signals of first and second sets of image frames or between signals of first and second image frames, whereas Lizzi only discloses differences in amplitudes of two time-varying signals or in amplitudes of signals of two sets of image frames or in amplitudes of signals of two image frames which do not take into account both phase and amplitude differences of two signals or both phase and amplitude differences of signals of two sets of image frames or both phase and amplitude differences of signals of two image frames.

Dory '258, as in Lizzi, likewise subtracts the previous image from the current image (column 3, lines 51-58) which is subtracting the amplitude of a second signal from the amplitude of a first signal.

The Examiner's rejection of claim 5, as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects this claim as being unpatentable over Okazaki or Lizzi or further in view of Dory and further in view of Cain '657. Claim 5 depends from claim 1, and applicant's previous remarks concerning the patentability of claim 1 over Okazaki and Lizzi are herein incorporated by reference. Further, Cain adjusts phase to refocus and not to reduce motion artifacts as required by applicant's claim 5.

The Examiner's rejection of claims 6-7, 11-12 and 20-21, as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects these claims as being unpatentable over Okazaki or Lizzi and further in view of Dory '258. Claims 6-7 and 11-12 depend from claim 1, claims 20-21 depend from claim 16, and applicant's previous remarks concerning the patentability of claims 1 and 16 over Okazaki and Lizzi are herein incorporated by reference. Further, the potentiometer 74 of Dory provides a variable mix of the latest image stored and the differential image and does not scale a difference signal as required by applicant's claim 6.

The Examiner's rejection of claims 8 and 22, as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects these claims as being unpatentable over Okazaki or Lizzi or further in view of Dory and further in view of Geiser '470. Claim 8 depends from claim

1, claim 22 depends from claim 16, and applicant's previous remarks concerning the patentability of claims 1 and 16 over Okazaki and Lizzi are herein incorporated by reference.

The Examiner's rejection of claims 13-15 and 25-29, as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects these claims as being unpatentable over Okazaki or Lizzi or further in view of Dory and further in view of both Dory and Geiser. Claims 14-15 depend from claim 13, claims 26-29 depend from claim 25.

Claim 13 requires receiving time-varying first and second signals F_1 and F_2 (see figures 4-5) from the same location and subtracting the second signal from the first signal to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second signals (see figure 7). As previously discussed, Okazaki only discloses differences in amplitudes of two time-varying signals which does not take into account both phase and amplitude differences between the two signals, and Lizzi only discloses differences in amplitudes of two time-varying signals which does not take into account both phase and amplitude differences between the two signals.

Claim 25 requires receiving first and second sets of frames comprising a plurality of time-varying imaging ultrasound wave signals from the same location during two different time periods and subtracting the time-varying imaging ultrasound signals of the second set of frames from the time-varying ultrasound signals of the first set of frames to derive a time-varying difference signal which takes into account both phase and amplitude differences between the first and second sets of frames. As previously discussed, Okazaki only discloses differences in amplitudes of two time-varying signals or in amplitudes of signals of two sets of image frames which do not take into account both phase and amplitude differences of two signals or both phase and amplitude differences of signals of two sets of image frames.
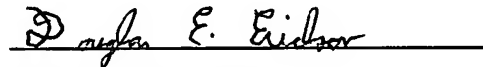
Further, the potentiometer 74 of Dory provides a variable mix of the latest image stored and the differential image and does not scale a difference signal as required by applicant's claims 13 and 25.

The Examiner's rejection of claims 31-32, as being "obvious", under 35 U.S.C. 103, is respectfully traversed. The Examiner rejects this claim as being unpatentable over Okazaki or Lizzi or further in view of Dory and further in view of Fujimoto '700. Claims 31-32 depend from claim 30, and applicant's previous remarks concerning the patentability of claim 30 over Okazaki and Lizzi are herein incorporated by reference.

Inasmuch as each of the rejections has been answered by the amended claims and above remarks, it is respectfully requested that the rejections be withdrawn, and that this application be passed to issue.

Respectfully submitted,

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